



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/930,295	08/16/2001	Alan G. Wood	M4065.0184/P184-A	9495
24998	7590	01/14/2004	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP 2101 L STREET NW WASHINGTON, DC 20037-1526			CHU, CHRIS C	
			ART UNIT	PAPER NUMBER

2815

DATE MAILED: 01/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/930,295

Applicant(s)

WOOD ET AL.

Examiner

Chris C. Chu

Art Unit

2815

MLW

-- The MAILING DATE of this communication appears n the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25, 26, 28 - 34 and 39 - 46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25, 26, 28 - 34 and 39 - 46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Request for Continued Examination

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 21, 2003 has been entered. An action on the RCE follows.

Response to Amendment

2. Applicant's amendment filed on October 7, 2003 has been received and entered in the case.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Art Unit: 2815

4. Claims 25, 26, 28, 30 and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by Yoon et al. '887.

Regarding claim 25, Yoon et al. discloses in e.g., Fig. 13 a semiconductor device package (1), comprising:

- a semiconductor device (3) having diced edges;
- a dielectric substrate (19) having diced edges;
- a metal layer (12) formed between said semiconductor device and said dielectric substrate, said metal layer having diced edges;
- a ball grid array (60) on said dielectric substrate, said dielectric substrate and said metal layer being located between said semiconductor device and said ball grid array;
- and
- electrical connections (40 and the structure between the solder ball 60 and the element 13) between said semiconductor device and said ball grid array,
- wherein said metal layer has a stiffness sufficient to enable simultaneous dicing of said semiconductor device edges, said dielectric substrate edges, and metal layer edges, so as to provide said package with aligned edges.

Furthermore, the phrase “to enables simultaneous dicing of said semiconductor device edges, said dielectric substrate edges, and metal layer edges” is intended use language which does not differentiate the claimed apparatus over Yoon et al.

Regarding claim 26, Yoon et al. discloses in e.g., Fig. 13 and column 19, lines 53 – 58 said metal layer providing a ground plane (28) for said electrical connections.

Art Unit: 2815

Regarding claim 28, Yoon et al. discloses in e.g., Fig. 13 said metal layer (12) being arranged to dissipate heat from said semiconductor device.

Regarding claim 30, Yoon et al. discloses in e.g., Fig. 13 said connections (40 and the structure between the solder ball 60 and the element 13) comprising wire bonds.

Regarding claim 31, Yoon et al. discloses in e.g., Fig. 13 said connections (40 and the structure between the solder ball 60 and the element 13) comprising conductive vias (the structure between the solder ball 60 and the element 13).

5. Claims 25 and 28 - 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Heo '689.

Regarding claim 25, Heo discloses in e.g., Fig. 6 a semiconductor device package, comprising:

- a semiconductor device (10) having diced edges;
- a dielectric substrate (22, at the top) having diced edges;
- a metal layer (21) formed between said semiconductor device and said dielectric substrate, said metal layer having diced edges;
- a ball grid array (60) on said dielectric substrate, said dielectric substrate and said metal layer being located between said semiconductor device and said ball grid array;
- and
- electrical connections (40) between said semiconductor device and said ball grid array,

Art Unit: 2815

- wherein said metal layer has a stiffness sufficient to enable simultaneous dicing of said semiconductor device edges, said dielectric substrate edges, and metal layer edges, so as to provide said package with aligned edges.

Furthermore, the phrase “to enables simultaneous dicing of said semiconductor device edges, said dielectric substrate edges, and metal layer edges” is intended use language which does not differentiate the claimed apparatus over Heo.

Regarding claim 28, Heo discloses in column 3, lines 45 and 46 said metal layer (21) being arranged to dissipate heat from said semiconductor device.

Regarding claim 29, Heo discloses in column 3, line 5 said metal layer (21) comprising copper.

Regarding claim 30, Heo discloses in e.g., Fig. 6 said connections (40) comprising wire bonds.

Regarding claim 31, Heo discloses in e.g., Fig. 6 said connections (40) comprising conductive vias (the bottom place of solder ball in layer 24).

Regarding claim 32, Heo discloses in e.g., Fig. 6 said connections (40) further comprising conductive traces (23) on opposite sides of said substrate.

Regarding claim 33, Heo discloses in e.g., Fig. 6 a semiconductor device package, further comprising solder bumps (11) on said semiconductor device, said bumps connected to said traces.

Regarding claim 34, Heo discloses in e.g., Fig. 6 an insulative solder mask (24) for covering said dielectric substrate

Art Unit: 2815

6. Claims 40, 41, 43 and 46 are rejected under 35 U.S.C. 102(b) as being anticipated by Hideshima et al. '865.

Regarding claim 40, Hideshima et al. discloses in e.g., Fig. 2 a semiconductor device package, comprising:

- a semiconductor device (11) having diced edges;
- a dielectric substrate (14) having diced edges over an upper side of said semiconductor device;
- a first metal layer (16) having diced edges below a lower side of said semiconductor device;
- a ball grid array (18B and 18E) over said dielectric substrate and on an opposite side of said dielectric substrate than said semiconductor device; and
- electrical connections (15B and 15E) between said semiconductor device and said ball grid array.

Regarding claim 41, Hideshima et al. discloses in e.g., Fig. 8 and column 6, lines 4 – 7 said first metal layer (16) has a stiffness sufficient to enable simultaneous dicing of said semiconductor device edges, said dielectric substrate edges, and said first metal layer edges, so as to provide said package with aligned edges. Furthermore, the phrase “to enables simultaneous dicing of said semiconductor device edges, said dielectric substrate edges, and metal layer edges” is intended use language which does not differentiate the claimed apparatus over Hideshima et al.

Regarding claim 43, Hideshima et al. discloses in e.g., Fig. 8 a second metal layer (18C) below a lower side of said first metal layer and on an opposite side of said first metal layer from said semiconductor device.

Regarding claim 46, Hideshima et al. discloses in e.g., Fig. 8 and column 6, lines 4 – 7 the second metal layer having diced edges aligned with edges of said first metal layer, said semiconductor device edges, and said dielectric substrate edges.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heo in view of Tuckerman et al. '539.

Heo discloses the claimed invention except for said metal layer providing a ground plane for said electrical connections. However, Tuckerman et al. teaches in e.g., Fig. 3 and column 4, lines 32 - 52 that a metal layer (44) providing a ground plane for an electrical connections. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Heo by using the metal layer as the ground plane for an electrical connections as taught by Tuckerman et al. The ordinary artisan would have been motivated to modify Heo in the

Art Unit: 2815

manner described above for at least the purpose of providing a pinhole-free capacitor dielectric and improving electrical performance (column 4, lines 39 - 52).

9. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heo in view of Saitoh et al. '084.

Heo discloses the claimed invention except for said metal layer having a thickness within the range of “about” 0.13 millimeters to “about” 0.25 millimeters. However, Saitoh et al. teaches in e.g., Fig. 3, column 2, lines 60 - 62 and column 3, line 51 that a metal layer (5B) having a thickness of from 5 μm to 150 μm which is within the range of “about” 0.13 millimeters to “about” 0.25 millimeters. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Heo by using the range of the thickness for the metal layer as taught by Saitoh et al. The ordinary artisan would have been motivated to modify Heo in the manner described above for at least the purpose of increasing electrical communication.

10. Claims 42 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hideshima et al. in view of Saitoh et al. '084.

Hideshima et al. discloses the claimed invention except for said first and/or second metal layer having a thickness within the range of “about” 0.13 millimeters to “about” 0.25 millimeters. However, Saitoh et al. teaches in e.g., Fig. 3, column 2, lines 60 - 62 and column 3, line 51 that a metal layer (5B) having a thickness of from 5 μm to 150 μm which is within the range of “about” 0.13 millimeters to “about” 0.25 millimeters. Thus, it would have been obvious

Art Unit: 2815

to one of ordinary skill in the art at the time when the invention was made to modify Hideshima et al. by using the range of the thickness for the first and/or second metal layer as taught by Saitoh et al. The ordinary artisan would have been motivated to modify Hideshima et al. in the manner described above for at least the purpose of increasing electrical communication.

11. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hideshima et al. in view of Magdo et al. '148.

Hideshima et al. discloses the claimed invention except for said first metal layer having a thickness of "about" 0.00254 millimeters. However, Magdo et al. teaches in e.g., Fig. 1E and column 7, lines 12 - 15 that a metal layer (15) having a thickness of 2.5 μm which is "about" 0.00254 millimeters. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to specifically set Hideshima et al.'s metal layer thickness to be about 0.00254 mm as taught by Magdo et al. The ordinary artisan would have been motivated to modify Hideshima et al. in the manner described above for at least the purpose of reducing height of the semiconductor package.

Response to Arguments

12. Applicant's arguments filed on September 30, 2003 have been fully considered but they are either moot in light of the new grounds of rejection or are not persuasive.

On page 6, applicant argues "Heo fails to disclose a metal layer having 'a stiffness sufficient to enable simultaneous dicing of said semiconductor device edges, said substrate edges, and said metal layer edges, so as to provide said package with aligned edges,' as recited

Art Unit: 2815

by independent claim 25” This argument is not persuasive. Heo clearly shows in e.g., Fig. 3g and column 4, lines 41 – 46 to cut the dielectric substrate edges and the metal layer edges according to the semiconductor device edges, so as to provide said package with aligned edges. Thus, Heo’s metal layer has stiffness sufficient to enable simultaneous dicing of said semiconductor device edges, said substrate edges, and said metal layer edges, so as to provide said package with aligned edges.

For the above reasons the rejection is maintained.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Djennas et al. discloses a semiconductor device.

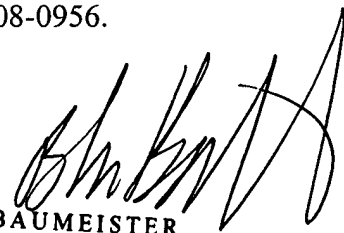
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

B. WILLIAM BAUMEISTER
PRIMARY EXAMINER



c.c.
1/10/04 1:43:09 PM